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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/345,238	06/30/1999	SCOTT SHAOBING CHEN	YO999-172	9988

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EXAMINER	
HAN, QI	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/345,238	CHEN ET AL.	
	Examiner	Art Unit	
	Qi Han	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *04/25/2007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Information Disclosure Statement

2. The references listed in the Information Disclosure Statement submitted on 04/25/2007 have been considered by the examiner (see attached PTO-1449).

Response to Amendment

3. This communication is responsive to the applicant's amendment filed on 10/11/2007, in which no claim is amended.

It is noted that the common knowledge or well-known in the art statement (official notice) for rejection of claims 6-7, 9, 20 and 27 is taken to be admitted prior art because applicant failed to traverse the examiner's assertion of official notice (see MPEP 2144.04.C)

Response to Arguments

4. Applicant's arguments filed on 10/11/2007 with respect to the claim rejection under 35 USC 102 and/or 103, have been fully considered but they are not persuasive.

In response to applicant's arguments regarding rejection of independent claims 1, 16, 23 and 30-35 under 35 USC 102 (b) that prior art (Chen) has "no indication of or suggestion to perform segmentation and clustering "substantially concurrently" and "actually teaches away

from the present invention by teaching that the clustering is performed only after the audio stream has been segmented" (see Remarks: page 3, paragraph 3 to page 6, paragraph 3), the examiner respectfully disagrees with applicant's arguments, and has a different view of the prior art teachings and the interpretations of the claimed limitations. It is appears that the applicant disagrees that Chen disclose both segmentation and clustering (also see Chen: page 1, paragraph 2); the only argument left is the limitation of "substantially concurrently".

It is noted that the specification (Fig.2) shows that block 220 "implement segmentation subroutine 300 (in Fig. 3)" is performed before block 230 "implement clustering subroutine 400 (in Fig.4)", which clearly satisfies the argued "the clustering is performed only after the audio stream has been segmented." Further, the specification states that "the clustering subroutine 400 initially collect the M new **segments** to clustered..." and "for **all unclustered segments**, the clustering subroutine 400 calculates the difference in BIC values...", which also clearly indicates that "the clustering is performed only after the audio stream has been segmented." In other words, the claimed "clustering homogeneous segments...substantially concurrently with said identifying step (segmentation)" does not exclude the situation that "the clustering is performed only after the audio stream has been segmented", based on broadest reasonable interpretation of the claim in light of the specification disclosure.

It is also noted that the applicant failed to response the examiner argument regarding Chen's disclosure satisfying the argued/claimed limitation in at least a situation of two data groups (segments) for clustering speaker(s), as stated in the Examiner's answer filed on 12/17/2003 (see Response to Argument: page 14). In fact, the teachings of applying the BIC criterion for clustering speakers disclosed by Chen inherently and/or necessarily include a

minimum condition/assumption, i.e. providing at least two data groups/segments; otherwise, the clustering cannot be performed at all. Clearly, Chen's disclosure satisfies the claimed limitation under at least this minimum condition/assumption, because Chen recites "comparing two models, one models the data as two Gaussian(s); the other models the data as just one Gaussian" to detect the changing point for segmentation (Chen, Section 3.1, page 4), such that at least two data groups (segments) are segmented (before) for clustering speakers (Chen, Section 4., page 8). Therefore, under at least this minimum condition, the segmentation and clustering of prior art has the same situation as that of the application disclosed and claimed, regardless of whatever the limitation "substantially concurrently" exactly means, thus, the prior art does disclose the claimed/argued limitation in claim 1, and it also satisfies the claimed "clustering segments from said audio source corresponding to the same speaker during said pass through said audio source" (claim 23). Therefore, the claim rejection is proper.

Regarding the rest of claims and references, the response is based on the same reason stated above, because the arguments (see Remarks: page 6, paragraph 4 to page 6, paragraph 5) is based on the same issue(s) as argued for claim 1.

For above reasons, the rejection is sustained.

Claim Rejections - 35 USC § 102

5. Claims 1-5, 8, 10-14, 16-19, 21-26 and 28-35 are rejected under 35 U.S.C. 102(b) as being anticipated by Chen et al. ("speaker, Environment and Channel Change Detection and Cluster via the Bayesian Information Criterion," proceedings of the DARPA broadcast news

transcription and understanding workshop, Lansdowne, VA, Feb 8-11, 1998) hereinafter referenced as Chen.

Regarding **claim 1**, Chen discloses speaker, Environment and Channel Change Detection and Cluster via the Bayesian Information Criterion for segmenting the audio stream into homogeneous region according to speaker identity, environmental condition and channel condition and clustering speech segments into homogeneous clusters according to speaker identity, environmental condition and channel (page 1, paragraph 2), which is read on the claimed "a method of tracking a speaker in an audio source, said method comprising the steps of: identifying potential segment boundaries in said audio source; and clustering homogeneous segments from said audio source substantially concurrently with said identifying step."

Regarding **claim 2**, Chen discloses everything claimed, as applied above (see claim 1). Chen further discloses that decision for detecting changes in speaker identity is based on the Bayesian Information Criterion (BIC) (page 2, paragraph 4), which is read on the claimed" wherein said identifying step identifies segment boundaries using a BIC model-selection criterion."

Regarding **claim 3**, Chen discloses everything claimed, as applied above (see claim 2). Chen further assumes that the sequence of cepstral vectors is draw from an independent multivariate Gaussian process and there is at most one changing point in the Gaussian process (page 3, paragraphs 4-5), and discloses that the hypothesis testing is viewed as a problem of model selection by comparing two models: one models the data as two Gaussians; the other models the data as just one Gaussian (page 4, paragraph 2), which is read on the claimed

"wherein a first model assumes there is no boundary in a portion of said audio source and a second model assumes there is a boundary in said portion of said audio source."

Regarding **claim 4**, Chen discloses everything claimed, as applied above (see claim 2). Chen further discloses a combination of two equations: the maximum likelihood ratio (page 3, equation (2)) and the difference between the BIC values of the two models (page 4, equation (3)), which is inherently equivalent to the equation as claimed.

Regarding **claim 5**, Chen discloses everything claimed, as applied above (see claim 1). Chen further discloses that an algorithm sequentially detect the changing points in the Gaussian process and suggests that the algorithm starts with a small window and then extends the window size in each detecting loop (page 6, paragraph 1). It is also inherently true that the smaller the window size, the more unlikely the segment boundary occurs. This is read on the claimed "identifying step considers a smaller window size, n, of samples in areas where a segment boundary is unlikely to occur."

Regarding **claim 8**, Chen discloses everything claimed, as applied above (see claim 2). Chen further suggests not using the detected change point in new process window (see the algorithm: set a= t + 1) (page 6, paragraph 1), which is read on the claimed "BIC model selection test is not performed at the border of each window of samples."

Regarding **claim 10**, Chen discloses everything claimed, as applied above (see claim 1). Chen further discloses to apply the BIC criterion in clustering (page 8, paragraph 2), which is read on the claimed "clustering step is performed using a BIC model-selection criterion."

Regarding **claim 11**, Chen discloses everything claimed, as applied above (see claim 10). Chen further discloses that in the hierarchical clustering two nodes can be merged only if the

merging increases the BIC value (abstract, also see page 9, paragraph 3) that suggests the two models used in identifying step are also applied in clustering step, which is read on the claimed "wherein a first model assumes that two segments or clusters should be merged, and a second model assumes that said two segments or clusters should be maintained independently."

Regarding **claim 12**, Chen discloses everything claimed, as applied above (see claim 11). Chen further discloses that the two nodes should not merger if an equation (8) (page 9, paragraph 4) is negative, which is read on the claimed "merging said two clusters if a difference in BIC values for each of said models is positive."

Regarding **claim 13**, Chen discloses everything claimed, as applied above (see claim 1). Chen further discloses that using M segments and k clusters (page 8, paragraphs 2 and 3) successively merge two nearest nodes in clustering step and generate a new cluster set S' from pervious set S (page 9, paragraph 3), which is read on the claimed "clustering step is performed using K previously identified clusters and M segments to be clustered."

Regarding **claim 14**, Chen discloses everything claimed, as applied above (see claim 1). Chen further suggests to assign s as an identifier for a new cluster from two previous nodes or clusters s1 and s2 after each merging (page 9, paragraph 3), which is read on the claimed "the step of assigning a cluster identifier to each of said clusters." In addition, it is inherently true that an index of data structure employed for clustering task can be always used as a cluster identifier in software and/or firmware based process.

Regarding **claim 16**, the rejection bases on the same reason described for claim, because Chen discloses the same method for both "segments from said audio source corresponding to

the same speaker" and "homogeneous segments". In addition, the applicant points out that "humongous segments" are "generally corresponding to the same speaker" (abstract).

Regarding **claim 17**, Chen discloses everything claimed, as applied above (see claim 16). Chen further discloses that decision for detecting changes in speaker identity is based on the Bayesian Information Criterion (BIC) (page 2, paragraph 4), which is read on the claimed "wherein said identifying step identifies segment boundaries using a BIC model-selection criterion."

Regarding **claim 18**, Chen discloses everything claimed, as applied above (see claim 17). Chen further assumes that the sequence of cepstral vectors is draw from an independent multivariate Gaussian process and there is at most one changing point in the Gaussian process (page 3, paragraphs 4-5), and discloses that the hypothesis testing is view as a problem of model selection from two models: one models the data as two Gaussians; the other models the data as just one Gaussian (page 4, paragraph 2), which is read on the claimed "wherein a first model assumes there is no boundary in a portion of said audio source and a second model assumes there is a boundary in said portion of said audio source."

Regarding **claim 19**, Chen discloses everything claimed, as applied above (see claim 16). Chen further discloses that an algorithm sequentially detect the changing points in the Gaussian process and suggests that the algorithm starts with a small window and then extends the window size in each detecting loop (page 6, paragraph 1). It is also inherently true that the smaller the window size, the more unlikely the segment boundary occurs. This is read on the claimed "identifying step considers a smaller window size, n, of samples in areas where a segment boundary is unlikely to occur."

Regarding **claim 21**, Chen discloses everything claimed, as applied above (see claim 16). Chen further discloses to apply the BIC criterion in clustering (page 8, paragraph 2). Moreover, Chen discloses that in the hierarchical clustering two nodes can be merged only if the merging increases the BIC value (abstract, also see page 9, paragraph 3) that suggests the two models used in identifying step are also applied in clustering step, which is read on the claimed "clustering step is performed using a BIC model-selection criterion, where a first model assumes that two segments or clusters should be merged, and a second model assumes that said two segments or clusters should be maintained independently."

Regarding **claim 22**, Chen discloses everything claimed, as applied above (see claim 16). Chen further discloses that using M segments and k clusters (page 8, paragraphs 2 and 3) successively merge two nearest nodes in clustering step and generate a new cluster set S' from pervious set S (page 9, paragraph 3), which is read on the claimed "clustering step is performed using K previously identified clusters and M segments to be clustered."

Regarding **claim 23**, the rejection bases on the same reason as applied above (see claim 16) because the same method in Chen's disclosure can also be applied for claim 23 "the steps of: identifying potential segment boundaries during a pass through said audio source; and clustering segments from said audio source corresponding to the same speaker during said pass through said audio source."

Regarding **claim 24**, Chen discloses everything claimed, as applied above (see claim 23). Chen further discloses that decision for detecting changes in speaker identity is based on the Bayesian Information Criterion (BIC) (page 2, paragraph 4), which is read on the claimed "said identifying step identifies segment boundaries using a BIC model-selection criterion."

Regarding **claim 25**, Chen discloses everything claimed, as applied above (see claim 24). Chen further assumes that the sequence of cepstral vectors is draw from an independent multivariate Gaussian process and there is at most one changing point in the Gaussian process (page 3, paragraphs 4-5), and discloses that the hypothesis testing is view as a problem of model selection from two models: one models the data as two Gaussians; the other models the data as just one Gaussian (page 4, paragraph 2), which is read on the claimed "wherein a first model assumes there is no boundary in a portion of said audio source and a second model assumes there is a boundary in said portion of said audio source."

Regarding **claim 26**, Chen discloses everything claimed, as applied above (see claim 23). Chen further discloses that an algorithm sequentially detect the changing points in the Gaussian process and suggests that the algorithm starts with a small window and then extends the window size in each detecting loop (page 6, paragraph 1). It is also inherently true that the smaller the window size, the more unlikely the segment boundary occurs. This is read on the claimed "identifying step considers a smaller window size, n, of samples in areas where a segment boundary is unlikely to occur."

Regarding **claim 28**, Chen discloses everything claimed, as applied above (see claim 23). Chen further discloses to apply the BIC criterion in clustering (page 8, paragraph 2). Moreover, Chen discloses that in the hierarchical clustering two nodes can be merged only if the merging increases the BIC value (abstract, also see page 9, paragraph 3) that suggests the two models used in identifying step are also applied in clustering step, which is read on the claimed "clustering step is performed using a BIC model-selection criterion, where a first model assumes

that two segments or clusters should be merged, and a second model assumes that said two segments or clusters should be maintained independently."

Regarding **claim 29**, Chen discloses everything claimed, as applied above (see claim 23). Chen further discloses that using M segments and k clusters (page 8, paragraphs 2 and 3) successively merge two nearest nodes in clustering step and generate a new cluster set S' from pervious set S (page 9, paragraph 3), which is read on the claimed "clustering step is performed using K previously identified clusters and M segments to be clustered."

Regarding **claim 30**, it recites an apparatus. The rejection is based on the same reason described for claim 1, because the claim recites the same or similar limitations as claim 1.

Regarding **claim 31**, it recites an article of manufacture. The rejection is based on the same reason described for claim 1, because the claim recites the same or similar limitations as claim 1.

Regarding **claim 32**, it recites an apparatus. The rejection is based on the same reason described for claim 16, because the claim recites the same or similar limitations as claim 16.

Regarding **claim 33**, it recites an article of manufacture. The rejection is based on the same reason described for claim 16, because the claim recites the same or similar limitations as claim 16.

Regarding **claim 34**, it recites an apparatus. The rejection is based on the same reason described for claim 23, because the claim recites the same or similar limitations as claim 23.

Regarding **claim 35**, it recites an article of manufacture The rejection is based on the same reason described for claim 23, because the claim recites the same or similar limitations as claim 23..

Claim Rejections - 35 USC § 103

6. Claims 6-7, 9, 20 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen in view of well known prior art (MPEP 2144.03).

Regarding **claim 6**, Chen discloses everything claimed, as applied above (see claim 5). Chen further cites that by expanding the window, the final decision of a change point is made based on as much data points as possible (page 6, paragraph 2). But, Chen fails to specifically disclose to increase small window size in slow manner and increase larger window size in a faster manner. However, the examiner takes official notice of the fact that it was well known in the art to adjust increase rate based on data size processed.

Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify Chen by specifically providing an adjustable increase rate base on processed window size, for the purpose of reducing processing time.

Regarding **claim 7**, Chen and well-known prior art disclose everything claimed, as applied above (see claim 6). Chen further discloses that the window size [a=t+1, b=a+1]=1 is reinitialized after detecting a segment boundary (page 6, paragraph 1), which is read on the claimed "window size, n, is initialized to a minimum value after a segment boundary is detected."

Regarding **claim 9**, Chen discloses everything claimed, as applied above (see claim 2). But, Chen fails to specifically disclose that "BIC model selection test is not performed when the window size, n, exceeds a predefined threshold." However, the examiner takes official notice of

the fact that it was well known in the art to stop a process when it exceeds a predefined threshold.

Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify Chen by specifically providing a predefined threshold and a test condition for the purpose of preventing a process from over sizing.

Regarding **claim 20**, Chen discloses everything claimed, as applied above (see claim 17). But, Chen fails to specifically disclose that "wherein said BIC model selection test is not performed where the detection of a boundary is unlikely to occur." However, the examiner takes official notice of the fact that it was well known in the art to skip certain portion of data for processing, because the portion has very small chance to be hit.

Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify Chen by specifically providing a skipping mechanism for those data that unlikely have a boundary for detection, for the purpose of increasing efficiency and reducing processing time.

Regarding **claim 27**, Chen discloses everything claimed, as applied above (see claim 26). But, Chen fails to specifically disclose that "wherein said BIC model selection test is not performed where the detection of a boundary is unlikely to occur." However, the examiner takes official notice of the fact that it was well known in the art to skip certain portion of data for processing, because the portion has very small chance to be hit.

Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify Chen by specifically providing a skipping mechanism for those

data that unlikely have a boundary for detection, for the purpose of increasing efficiency and reducing processing time.

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen in view of Kleider et al. (USPN 5,930,748), hereinafter referenced as Kleider.

Regarding **claim 15**, Chen discloses everything claimed, as applied above (see claim 1). But, Chen fails to specifically disclose "processing said audio source with a speaker identification engine to assign a speaker name to each of said cluster." However, the examiner contends that the concept of providing an identified speaker cluster with a speaker name was well known, as taught by Kleider.

In the same field of endeavor, Kleider discloses a speaker identification system and method. Kleider employs a speaker identification metric (226) (Fig. 2) in that each element is associated with one particular speaker in the speaker model data 213 (Fig. 2) (column 6, lines 25-32). Kleider further suggests that the information of the speaker model data may include speaker name (column 6, line 44).

Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify Chen by specifically providing a speaker identification mechanism to associate a speaker cluster identifier with a speaker name, as taught by Kleider, for the purpose of using a common identifier in a speaker identification system.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Please address mail to be delivered by the United States Postal Service (USPS) as follows:

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Qi Han whose telephone numbers is (571) 272-7604. The examiner can normally be reached on Monday through Thursday from 9:00 a.m. to 7:30 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil, can be reached on (571) 272-7602.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Inquiries regarding the status of submissions relating to an application or questions on the Private PAIR system should be directed to the Electronic Business Center (EBC) at 866-217-9197 (toll-free) or 703-305-3028 between the hours of 6 a.m. and midnight Monday through Friday EST, or by e-mail at: ebc@uspto.gov. For general information about the PAIR system, see http://pair-direct.uspto.gov.

QH/qh
December 13, 2007

RICHEMOND DORVIL
SUPERVISORY PATENT EXAMINER